THE INSTITUTE SPOKESMAN

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Edgewater Beach Hotel, Chicago, Illinois, October 16, 17 and 18, 1947

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R. J. S. Pigott

Mr. R. J. S. Pigott
Chief Engineer
Gulf Research and Development Co.
Pittsburgh, Pennsylvania
Pres.-elect S.A.E.

"SOME TEST EQUIPMENT FOR GREASES"

Graduated from Columbia University in 1906 with degree of Mechanical Engineering. Professor of Steam Engineering at Columbia University for one year. 1915-20 consulting engineer, construction of power and service equipment for Remington Arms. Superintendent of Mills of Bridgeport Brass Company. Works Manager of Crosby Steam Gage and Valve Company, introducing new designs of safety valves and steam gages and similar equipment. In 1922 returned to the power industry as Mechanical Engineer at Stevens and Wood; later for Public Service Production Company, designing and constructing large power plants. From 1929 to date, Chief Engineer of Gulf Research and Development Company in charge of engineering research for Gulf Oil Corporation and its subsidiaries. Inventor of about 30 patents on power plant equipment, oil burners, meters, test equipment and pumps. Chairman of ASME Special Research Committee on Fluid Meters from 1916-46; member of Main Power Test Codes Committee of ASME from 1918-1946. First President of former American Society for Measurement and Control, now the Pittsburgh Chapter of the Instrument Society of America. Author of about 40 technical papers on power plant design, gluid flow, instruments, lubrication, fuel and lubrication systems in aviation, and superchargers. Mr. Pigott is President-elect of the Society Automotive Engineers.

Mr. C. L. Johnson, President
Jesco Lubricant Co.
North Kansas City, Missouri

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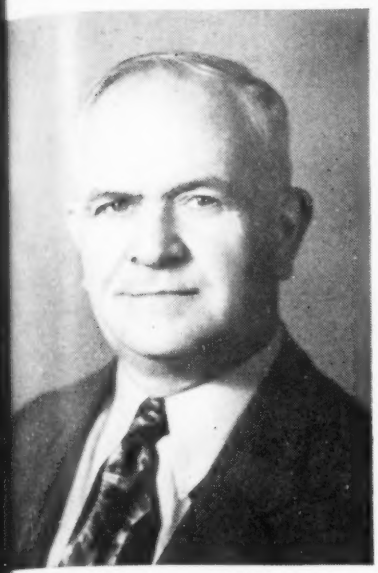

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Mr. Dwight F. Benton Standard Oil Company (Indiana) Elected to N.L.G.I. Board of Directors

Mr. Dwight F. Benton, General Manager, Lubricating Sales, Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, 80, Illinois, was elected a Director of the National Lubricating Grease Institute to fill the unexpired term of Mr. L. C. Welch, retired, at a meeting of the N.L.G.I. Board of Directors held at the Hotel Traymore, Atlantic City, N. J., September 19th, 1947.

Mr. Benton joined Standard Oil Company (Indiana) in 1923 as a member of the first sales engineering school at the Whiting, Indiana, refinery. He became a salesman at Duluth, Minnesota, in 1924; transferred to the Midwest Refining Company, a former subsidiary of Standard of Indiana, in 1929; and served as a sales promoter at Denver, Colorado. In 1931 he was advanced to assistant manager at Denver, where he became manager in 1934. In 1939 he became manager of the Rocky Mountain sales division, and in 1946 was promoted to assistant general manager of sales for the Rocky Mountain division with headquarters at Denver.

Later in 1946 Mr. Benton became assistant general manager of the lubricating and sales technical service departments in the general office of Standard of Indiana at Chicago and in 1947 was advanced to general manager of those departments.

Thirteen of the seventeen members of the N.L.G.I. Board were in attendance, presided over by Mr. H. P. Hobart, Manager, Lubricating Sales, Gulf Oil Corporation, Pittsburgh, Pennsylvania.

Other important actions taken by the Board were the approval of a budget for 1947-48 as recommended by the Finance Committee and approval of the final reports of the Program and Entertainment Committees for the 15th Annual N.L.G.I. Convention scheduled for the Edgewater Beach Hotel, October 16-18.

The next meeting of the N.L.G.I. Board will be for luncheon on Thursday, 12:30 P.M., October 16, 1947 at the Edgewater Beach Hotel in Chicago.

All sessions of the convention will be held in the East Lounge at the Edgewater Beach Hotel.

Dwight F. Benton

***The* INSTITUTE SPOKESMAN**

Published monthly by
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THE INSTITUTE OF PETROLEUM RELEASES A NEW TEST METHOD FOR EVALUATING OIL SEPARATION FROM GREASES IN STORAGE

Col. S. J. M. Auld, Chairman of the Institute of Petroleum Sub-Committee 12 on Greases, has kindly supplied the NLGI with a copy of a proposed new test method for evaluating the oil separation tendencies of lubricating greases in storage. Since test methods for this purpose are of considerable general interest and since the proposed new Institute of Petroleum Method represents a new and interesting approach to this problem, the complete method and procedure are given in the following as an item for general information. It should be emphasized that the details of this method are being published for information only as we have not had word from the Institute of Petroleum that the method has been officially adopted.

OIL SEPARATION ON STORAGE TEST

Scope

1. This method is intended to determine the tendency of a grease towards oil separation during storage. The results correlate well with those observed during storage of grease in cans and drums.

Definition

2. By the term "stability of a grease with regard to storage, etc." is meant the oil-binding capacity of the soap skeleton under given conditions. Oil separates into voids such as air bubbles, or hollows and depressions of the grease, i.e. at an interface.

Outline of Method

3. The grease is tested in a separation cup in which a column of grease resting on a metal-gauze cone is subjected to a fixed pressure in excess of the hydrostatic pressure of the grease. The quantity of oil separated through the gauze after standing for 7 days at 25° C or 40° C is taken as a measure of the stability of the grease towards oil separation during can and drum storage.

Apparatus

4. (a) *Separation Apparatus*, as shown in Fig. 1, consisting of a metal cylinder having a cone of 60 mesh metal gauze (B.S.S. standard for sieves) soldered to the bottom; a 100 + 0.1 g. metal weight serves to supply the added weighting pressure.

Note 1. Stainless steel, Monel or similar metals are suitable for these purposes.

(b) *Oil Cup* of metal or glass of proper diameter and depth to support the separation apparatus so that the apex of the gauze cone is at all times above the oil that is collected.

Note 2. Standard asphalt penetration tins, 55 mm. in diameter and 35 mm. in depth are satisfactory.

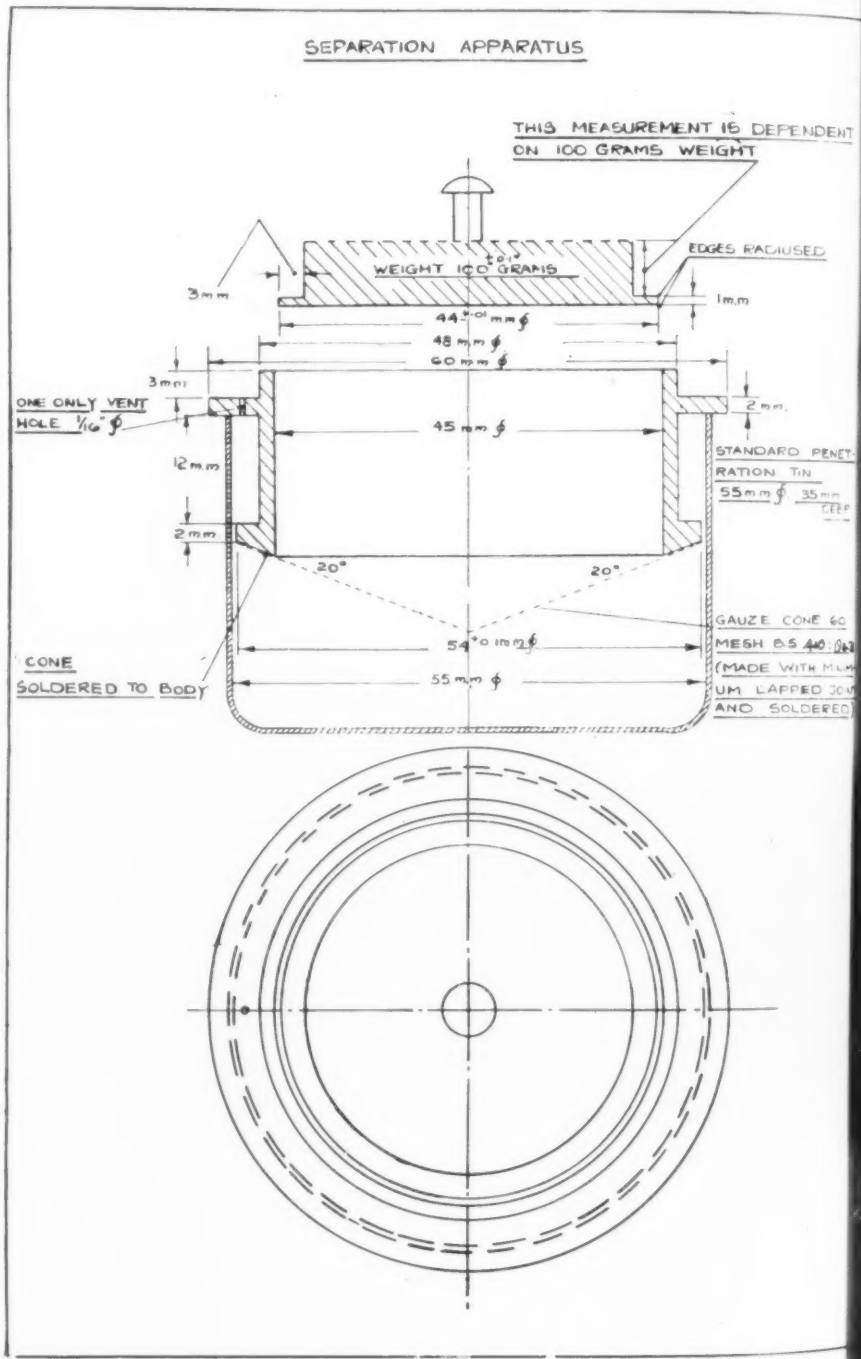
Procedure

5. (a) Weigh the empty cylinder.

(b) Fill the cylinder with sample, minimizing formation of air pockets. If possible, force a small portion of the sample through the gauze, and smooth off the surface with a spatula, so that it is flush with the top of the cylinder. Wipe off any grease that extrudes through the gauze, with the finger.

(c) Weigh the filled cylinder.

(d) Weigh the oil cup. Place the filled cylinder on the oil cup, s



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the 100g. weight centrally on the top of the sample, and place in a chamber maintained at 25° or 40° C ± 1° C.

(c) At the end of 7 days, remove the oil cup and weigh.

Note 3. When a drop of oil hangs at the top of the gauze cone, it should be discharged into the cup before weighing the cup and oil.

Calculation and Reporting

6. Calculate the amount of oil separated, by means of the following equation:

$$\text{Separated Oil \% Wt.} = \frac{(A)\ (100)}{W}$$

where:

A = Weight of separated oil, in grams.

W = Weight of sample in grams. and report as % Wt. of oil separated after 7 days storage at 25° C or 40° C.

Note 4. The test shall be carried out in triplicate and the average reported to the nearest 0.5% by weight.

Precision

7. No specific permissible variations can be given.

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MICRO PENETRATION of Lubricating Greases

Report by Section II on Consistency Measurements and Related Physical Tests for Lubricating Greases, of Technical Committee G on Lubricating Grease, of Committee D-2 on Petroleum Products and Lubricants

SYNOPSIS

A method of obtaining penetrations of small samples of grease of the order of 4 g. is discussed, which gives results of reasonable reproducibility. The apparatus is inexpensive, since it utilizes the present A.S.T.M. penetrometer and requires in addition only a simply constructed grease holder and an aluminum plunger and cone. The correlation between A.S.T.M. penetration values and results by the micro penetrometer is also given.

The Tentative Method for Consistency of Lubricating Greases and Petrolatum (D 217–44 T)[3] requires that a considerable quantity of grease be available, that is, at least 400 to 500 g. for grease of soft or moderately soft consistencies. Although such quantities of grease are readily obtainable in the manufacturing plants or in storage, it frequently happens that information on the consistencies of very small samples of grease is desired. For example, after use on ball or roller bearings, such as the antifriction bearings of motors, automobile wheels, industrial machines, etc., only relatively small quantities of worked or used grease adhere to the bearings. This amount of used grease is inadequate for actual measurements of consistency by the A.S.T.M. method.

In response to a questionnaire distributed by A.S.T.M. Technical Committee G, Section II, consumers and producers expressed the opinion that, in view of the above objection to the A.S.T.M. method, a micro penetration method would be desirable. The Texas Company's micro penetration procedure[4] was chosen by Technical Committee G as the method for study since it was the only method in any extensive use and which required only small grease samples.

In developing procedures for determining consistencies of small quantities of semisolid materials such as lubricating greases, as expressed in terms of the depth of penetration of a plunger, the apparent solution has been to use a small penetrometer needle and a small holder for the grease in place of the present A.S.T.M. grease cone (6.51 cm. (2.56 in.) in diameter), and the rather large sized grease holder (453.6-g., 1-lb., tins are recommended).

Various types of small plungers such as glass rods of different weights have been used in order to reduce the size of the plunger cone. However, the chief difficulty involved in these cases has been suitable design of a small holder for the grease, since charging of a small cylinder with a semisolid material such as a lubricating grease causes air entrainment as well as working down of the grease structure and consequent alteration in consistency. These difficulties are overcome by using a split cylinder for the holder in the micro penetration procedure. Each half of the cylinder can be charged with grease by simply using a spatula. The working down of the grease is practically negligible and air entrainment is reduced to a minimum.

The penetrometer cone in the A.S.T.M. method, as stated above, has a maximum diameter of 6.51 cm. (2.56 in.), the total weight of cone and plunger being 150 In the case of the micro penetrometer

NOTE.—DISCUSSION OF THIS PAPER IS INVITED, either for publication or for the attention of the author. Address all communications to A.S.T.M. Headquarters, 1916 Race St., Philadelphia 3, Pa.

[1] Presented at a meeting of Section II on Consistency Measurements and Related Physical Tests for Lubricating Greases, of Technical Committee G on Lubricating Grease, of Committee D-2 on Petroleum Products and Lubricants, Atlantic City, June 16, 1947.

[2] Report prepared under the direction of Gus Kaufman, The Texas Company, New York, N. Y.

[3] 1946 Book of A.S.T.M. Standards, Part III-A, p. 846.

[4] G. Kaufman, W. J. Finn, and R. J. Harrington, "Miniature Penetrometer for Determining Consistency of Lubricating Greases," *Industrial and Engineering Chemistry*, Anal. Ed., Vol. 2, p. 108 (1939).

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the size and weight of the plunger have been reduced by the use of an aluminum plunger and cone having a total weight of but 20 g. The small grease holder and plunger are then used in conjunction with the present A.S.T.M. grease penetrometer indicator.

Description of Apparatus and Procedure

A detailed description of the apparatus and procedure is given in the Appendix.

Experimental Data

In order to study the micro penetrometer cone and cup for penetration testing of very small grease samples, a cooperative testing program was initiated. It was requested that both unworked and worked penetrations at 77 F. be run. Unworked penetration was taken to be the result obtained after the grease was transferred from the original container to the micro test cup with a minimum of working. Worked penetration was understood to be the result obtained after transferring the sample from the A.S.T.M. worker cup, after 60 strokes working, to the micro cup. Twelve laboratories submitted data and four laboratories ran repeat tests, making a total of sixteen sets of data on each of the following four greases:

1. Aluminum-base grease,
2. Calcium-base grease,
3. Soda-base grease, and
4. Soda-base grease made with high-viscosity oil.

Continued on Page 11

Table I.—Cooperative Micro Penetrations (First Program).

	Grease 1		Grease 2		Grease 3		Grease 4	
	Unworked	Worked	Unworked	Worked	Unworked	Worked	Unworked	Worked
Average	300	365	150	155	60	85	60	70
Maximum	339	397	167	165	67	92	69	86
Minimum	250	329	136	146	52	71	52	59
Spread	89	68	31	19	17	21	17	27

Table II.—Cooperative Micro Penetration (Second Program) (Unworked Penetrations at 77 ± 3 F.).

Laboratory	Grease 5	Grease 6	Grease 7	Grease 8
1	94	138	220	145
3	104	139	235	150
	113	142	236	146
	106	150	234	152
4	108	150	244	165
5	133a	172a	288a	202a
6	104	143	258	163
	117	148	262	179
	104	141	261	171
7	199a	314a	444a	301a
	220a	336a		
8	103	142	240	148
9	99	138	231	146
10	99	137	210	139
11	99	137	225	163
SUMMATION				
Average	105	143	238	155
Maximum	117	150	262	179
Minimum	94	137	210	139
Spread	23	13	52	40

a Omitted from summations. Large deviation from other laboratories considered to be due to incorrect weight of micro cone and shaft or other such instrument variation.

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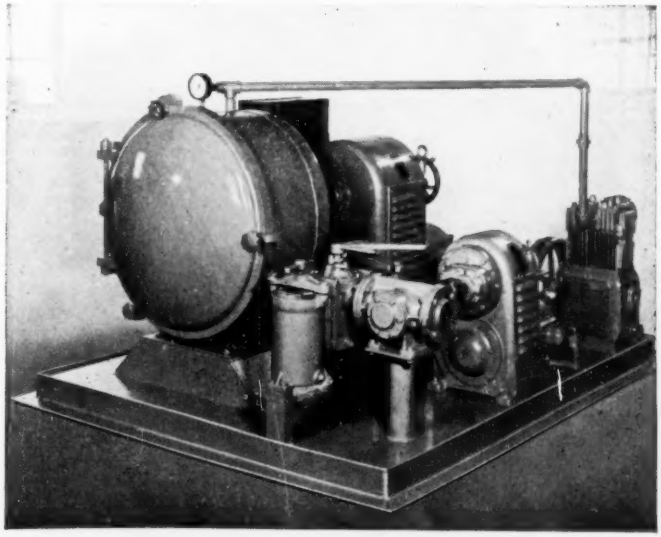

Grease Homogenizer, showing feed pumps, strainers and vacuum pump.

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President's Column . . .

LUBRICATING OILS VS. GREASES

H. P. Hobart, President N.L.G.I.

The Institute is interested in bringing to the attention of operators of all forms of industrial equipment the many advantages which lubricating greases offer when properly applied under conditions for which they are correctly suited.

There is much to be gained by an adequate appreciation of the characteristics of grease vs. oil and by accurate knowledge of conditions under which lubricating greases offer practical advantages compared with lubricating oils and of conditions under which lubricating oils are more suitable.

The principal reasons for compounding soaps into lubricating oils to produce greases are —

1. To increase consistency.
2. To increase adhesiveness.

As a rule practically all soaps are more readily oxidized than well refined lubricating oils. Therefore, the oxidation resistance of a lubricant is not improved by adding soaps. However, improved resistance to oxidation of the grease may be secured by the addition of suitable additives.

The selection of a grease rather than an oil primarily depends upon the methods of application used or contemplated.

Greases are usually advantageous for the following purposes:

1. To help prevent the lubricant from leaking or running out of a bearing or gear box.
2. To help prevent the lubricant from being thrown off of rotating, oscillating or reciprocating parts.
3. To help prevent lubricant from flowing off by gravity from vertical or inclined guides, runways, etc.
4. Some greases, when applied to metallic surfaces, withstand the washing effects of water better than most oils.

There are many conditions for which greases have definite practical advantages over oils:

1. Equipment designers seldom go to the expense of making certain types of bearings oil tight or even sufficiently oil tight to prevent undue leakage. Such bearings usually call for grease lubrication.
2. Equipment manufacturers often do not make gear boxes including shaft bearings running through same sufficiently tight to hold oil. Grease is usually required under such conditions.
3. Greases of proper make-up and consistency can be used successfully to lubricate open gears from which oil would be thrown off at high speeds.
4. In various types of equipment, such as textile machinery, greases are used in place of oils to reduce the "throw" which might cause damage to the products.
5. Greases are often used to prevent leakage that might cause dangerous accident or fire hazards on floors, etc.
6. Vertical guide runners, such as elevator guides, vertical guide rods, etc., can be lubricated by grease for much longer periods of time than with oil as oil would have a tendency to run off by gravity.

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7. Greases have real value as dust seals for bearings, etc., and by means of pressure grease fittings bearings may be given practical protection from dust, abrasives, rain, etc. because the outward flow of the grease under pressure pushes or carries out with it such contaminants which might otherwise creep into and damage such bearings.
8. Many greases have excellent rust preventive properties.
9. Because grease will often remain in place longer than oil its use may entail less frequent applications and, therefore, save labor.

There seems to be a rather widely held misconception that because the consistency of a grease is heavier than that of an oil that the grease will handle higher bearing pressures in proportion to its consistency. The lubricating value of a grease is little better than that of the base oil used in the grease, except greases containing fillers which themselves are lubricants, such as graphite, and which do tend to increase the pressure which would be necessary to break through the lubricating film.

Some users have the misconception that a No. 5 consistency grease will handle a materially higher bearing pressure in pounds per square inch than a No. 1 or No. 2 consistency. The reason for various consistencies in greases has to do primarily with the type of application, or its ability to be retained in bearings, gear boxes, on vertical or inclined guides, etc.

Some film strength additives when compounded into an oil will tend to set-

Continued on following page

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PRESIDENT'S COLUMN

Continued from Page 9

tle out, but when soaps are present will be better held in suspension.

Additives may be added to greases to increase any of the following characteristics:

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Tackiness Agents
Thickening Agents
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Wetting Agents

Certain heavy gear lubricants produced from heavy residual oils containing no soap, while usually sold by the pound, are not really greases. They are particularly valuable for the lubrication of heavy open gears because of their very high adhesiveness to metal surfaces, and their tacky nature which helps them to resist high pressures. When ordinary soaps are added, such as calcium, sodium, aluminum, etc., these lubricants become shorter, more buttery, and their load-carrying capacity is reduced unless additives are added.

Space here does not permit a more detailed analysis of this subject, but I hope that these brief notes will influence some members to present a paper before the Institute defining in much greater detail various conditions under which industry in general may expect lubricating greases to offer definite practical advantages over lubricating oils. Such a paper should find considerable interest among grease consumers.

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MICRO PENETRATION of Lubricating Greases

Continued from Page 7

A summary of the results of this testing is shown in Table I. It may be noted that reproducibility in the case of grease No. 1 (365 unworked A.S.T.M. penetration) was very poor. With greases Nos. 2, 3, and 4, reproducibility was indicated to be quite good, but the low order of penetration readings is noteworthy.

Since the test reproducibility on grease No. 1 in this first testing program was not considered very satisfactory and because it was believed better reproducibility should be obtained on all samples, a second cooperative testing program

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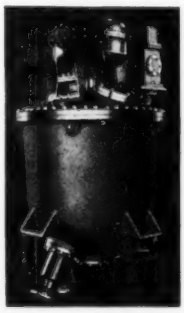

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MICRO PENETRATION

Continued from Page 11

was set up. Ten laboratories participated in the testing of four reference greases. Tests were run at 77 ± 3 F., the sample receiving no working other than that involved in transferring the grease from the sample cans to the micro cup.

Micro penetration values obtained by these laboratories are shown in Table II. Penetration results in this case were quite similar to those obtained in the previous cooperative program and indicated that the micro penetration method is reasonably reproducible between laboratories with greases of quite stiff consistency, but not very satisfactory with softer greases.

Due to the belief that the degree of test reproducibility had been greatly influenced in the previous testing by variations in weights of the micro cone and shaft as well as possible variations in testing procedures, it was agreed that a micro penetrometer "clinic" should be held where all cooperators would be present at one time, thereby being better able to determine possible causes for differences in results. Accordingly, representatives from four laboratories participated in testing five reference greases under very closely controlled conditions. The tests were run on the worked grease at a constant room temperature (78 F.) with all operators using the same micro penetrometer and A.S.T.M. worker. Greases tested were as follows:

9. Calcium-base grease,
10. Calcium-base grease,
11. Soda-base grease,
12. Soda-base grease, and
13. Mixed base lime-soda grease containing low-viscosity oil.

TABLE III. — COOPERATIVE MICRO PENETRATIONS (CLINIC TESTING)
(WORKED PENETRATON AT 78 F.)

Grease	9	10	11	12
Average	186	77	87	63
Maximum	191	79	89	64
Minimum	178	74	82	62
Spread	13	5	7	2

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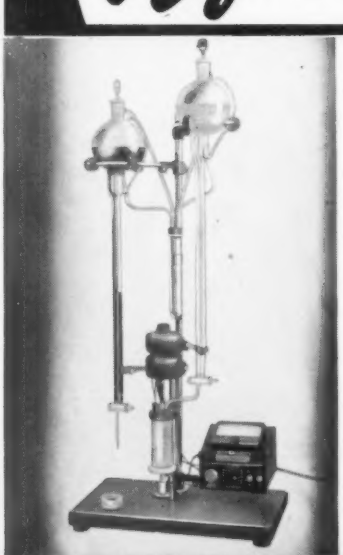

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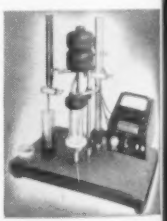

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Table III gives a summary of the netration values obtained at the micro netrometer "clinic." The reproducibil- in the case of grease No. 12, the one lowest consistency, was ±2 points hile the reproducibility was ±7 points the case of grease No. 9, the one of hest consistency (maximum value of 1). Thus, the numerical value repre- nting the reproducibility becomes in- singly larger (poorer reproducibility) the consistency of the grease being sted increases. This same relationship decreasing reproducibility of the test thod with increasing grease consistency sted throughout the cooperative test- Thus, it may be concluded that a roducibility of ±7 points may be ex- cted with the micro penetration pro- dure on greases having a micro pene- tion of 200 or less. On greases of lower nsistency, better reproducibility may expected.

Since the ultimate usefulness of the icro penetration method depends to a ge extent on reasonably accurate cor-

Continued on following page

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QUES. What are *some* of the products or processes in or on which graphite is used? (*Continued from No. 3*)

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Crucibles, retorts and stopper heads
Refractory cements and linings
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Ingot and riser pipe eliminator graphite
Steel case-hardening bath graphite
Ingot mold wash
Foundry facings and core wash
Permanent mold coating
Protective coatings and paints
Vegetable seed coating
Stove polish
Amber glass coloring graphite
Motor and generator brushes and contacts
Resistance units
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MICRO PENETRATION

Continued from Page 13

relation with standard 150-g. cone penetrations, it was desired to accumulate as many data as possible on comparisons of micro with standard penetrations. It was therefore requested that during the cooperative testing the cooperating laboratories supply test comparisons on greases of various consistencies and types. From these data, a curve showing the relation of the micro penetrometer tests to standard 150-g. cone tests for a large variety of greases was constructed and is shown in Fig. 1. Each point plotted represents a different grease and covers practically all types and varieties of grease as to soap base and mineral oil constituent.

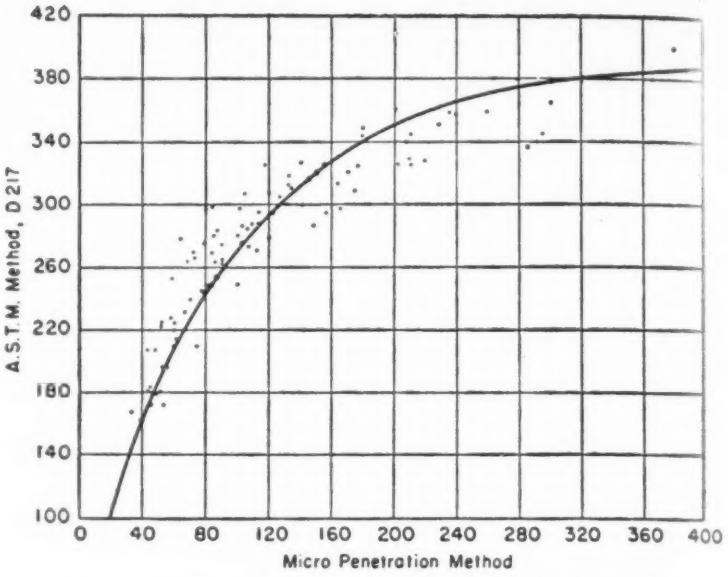

Fig. 1.—Comparison of A.S.T.M. Consistency versus Micro Penetration Method.

SUMMARY

The micro penetrometer permits consistency measurements on small samples of grease — that is, about 3 to 5 g. Usually more than this quantity of used grease can be readily recovered from antifriction bearings of average size. The micro penetrometer also allows check determinations with a small supply of sample and fairly consistent check results are possible on the same sample of used grease.

The micro penetration procedure can be considered satisfactorily reproducible. With greases showing about 200 micropenetration (approximately 350 A.S.T.M. penetration) the reproducibility is ±7 points and is even better at lower penetrations.

APPENDIX

METHOD OF TEST FOR MICRO PENETRATION OF LUBRICATING GREASE[1]

Scope

1. (*a*) This method of test is intended for the measurement of the penetration of lubricating greases as an empirical measure of consistency where the quantity of grease available is too small for consistency measurements by A.S.T.M. Method D 217, Test for Consistency of Lubricating Greases and Petrolatum.[2] The values obtained are a purely arbitrary evaluation of consistency and it is imperative that test conditions be adhered to in detail. The test is applicable to greases having micro penetration up to 200. The method contains two procedures as follows:

Procedure A, for penetration of worked lubricating greases (NOTE 1), *and*

Procedure B, for penetration of unworked lubricating greases.

(*b*) Unworked penetrations are affected by a number of factors which are difficult to control (NOTE 2), and do not generally represent the consistency of grease in use as effectively as worked penetrations which should therefore be preferred for evaluating lubricating grease, wherever practicable.

NOTE 1.—Although this method is intended primarily for penetration tests on very small samples, the procedure for worked penetration is included since a comparison of the worked consistency of the unused grease with the consistency of small fractions of grease, obtained from different locations on test devices employing ball or roller bearings, is sometimes desired.

NOTE 2.—The unworked penetration of a grease may not be a reliable measure of its consistency in its original state of manufacture. Any transferring or other manipulating of grease subsequent to manufacture tends to affect the unworked penetration by amounts depending on the type of the grease and the handling it is given. The term "work" is used herein to denote the intentional altering of the consistency of a grease by subjecting it to 60 strokes of the specified worker.

[1] G. Kaufman, W. J. Finn, and R. J. Harrington, "Miniature Penetrometer for Determining the Consistency of Lubricating Greases," *Industrial and Engineering Chemistry*, Anal. Ed., Vol. 2, p. 108 (1939).

[2] 1946 Book of A.S.T.M. Standards, Part III-A, p. 846.

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Definitions

2. For the purpose of this method, the following definitions will apply:

(*a*) *Penetration* is the distance in tenths of a millimeter, which the micro cone, under the specified conditions of the method, will penetrate a lubricating grease in 5 sec. A single determination of penetration will be referred to as a "test."

(*b*) *Worked Penetration* is the penetration of a sample of grease immediately after transferring it to the micro cup from the grease worker where it has been brought to 77 F. and subjected to 60 strokes of the specified grease worker.

(*c*) *Unworked Penetration* is the penetration at 77 F. of a sample of lubricating grease after the grease, which has not been subjected to the action of the grease worker, has been transferred from the original container to the micro test cup with a minimum of working.

Apparatus

3. The apparatus shall consist of the following:

(*a*) *Penetrometer.* — An instrument for applying the specified cone to the surface of the sample and for measuring the penetration distance at the conclusion of the test. It shall be so constructed that it permits (by means of a slow-motion adjustment) the accurate placement of the tip of the cone adjoining the level surface of the sample while maintaining a "zero" reading on the indicator, and that it permits the cone to fall, when released, without appreciable friction. The instrument shall be provided with leveling screws and a spirit level to maintain the cone shaft in a true vertical position. A simplified sketch of such a penetrometer with cone attached is shown in Fig. 2.

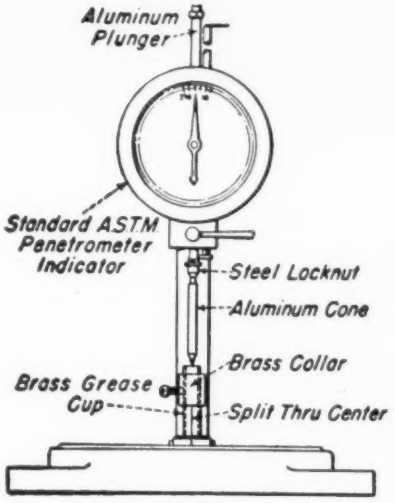

Fig. 2.—Schematic Drawing of Penetrometer with Cone Attached.

(*b*) *Micro Cone Set.*[3]—An aluminum micro cone set consisting of a cone, plunger with collars and locknut conforming to the dimensions shown in Fig. 3. The outer surface of the cone and tip shall be given a very smooth finish. The weight of the cone shall be 5 g. The combined weight of the plunger and locknut shall be 15 g.

(*c*) *Grease Cup.*—The grease cup shall consist of a split brass bushing affixed to a suitable base and a brass collar with set screw for holding the two valves together as shown in Fig. 3. This grease cup has a capacity of approximately 4 g. of grease but smaller amounts can be evaluated, if the grease is not too soft, by using wooden plugs to fill the lower part of the cup.

(*d*) *Grease Worker.*—A worker, as shown in Fig. 4, provided with a movable bi-metallic thermometer of short scale range including 77 F., for inserting through the vent cock. Alternative methods of closure to that shown in Fig. 4 or other details of the exterior

[3] The micro cone set is available from Precision Scientific Co., Chicago, Ill.

Continued on following page

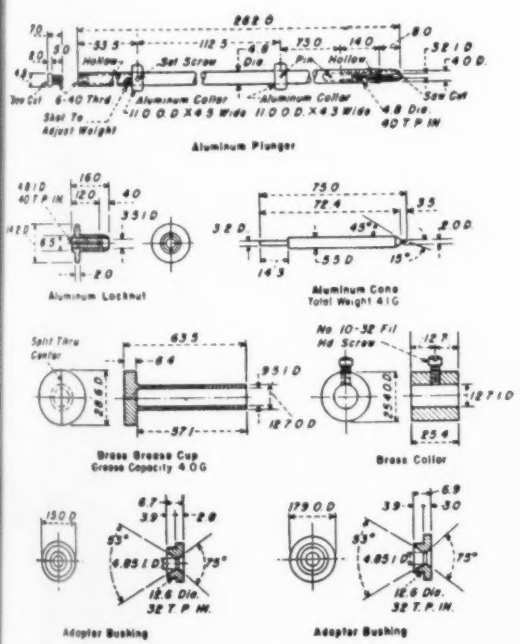

Fig. 3.—Schematic Drawing of Aluminum Cone Set. All dimensions are in millimeters.

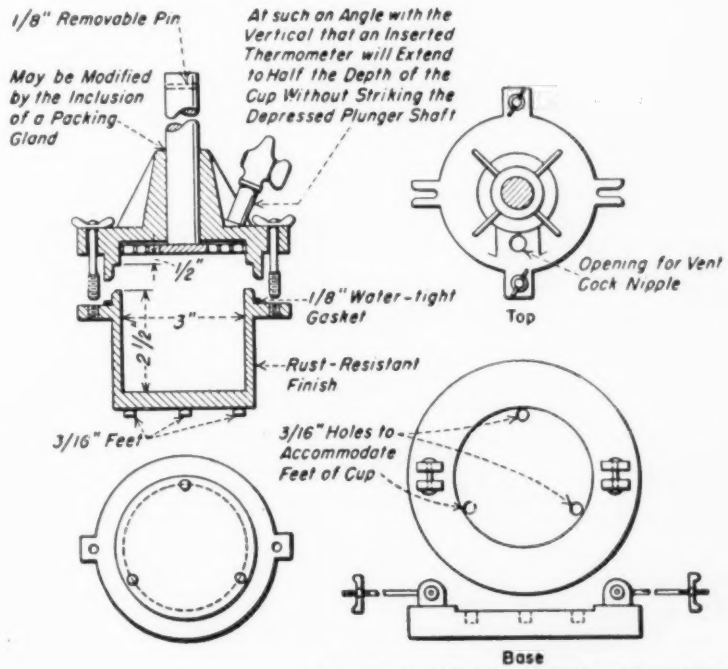
1/8" Removable Pin
May be Modified by the Inclusion of a Packing Gland
At such an Angle with the Vertical that an Inserted Thermometer will Extend to Half the Depth of the Cup Without Striking the Depressed Plunger Shaft
1/2"
1/8" Water-tight Gasket
3"
2 1/2"
Rust-Resistant Finish
3/16" Feet
Opening for Vent Cock Nipple
Top
3/16" Holes to Accommodate Feet of Cup
Base
(May be Modified to Suit Mode of Operation)

Fig. 4.—Grease Worker.

MICRO PENETRATION

Continued from Page 15

of the worker shall be permitted, provided such changes do not adversely affect the operability of the worker. The worker may be operated either manually or mechanically, provided a rate of about 60 strokes per minute can be obtained.

(*e*) Constant-Temperature Bath.—A constant-temperature testing room or an air bath capable of regulation to 77 ± 1 F.

(*f*) *Spatula.*—A spatula, of corrosion-resistant steel, having a stiff blade 1¼ in. in width and at least 6 in. in length with its end cut on the square.

Procedure A. Penetration of Worked Lubricating Grease (Note 1)

Sample

4. The sample for worked penetration shall be of sufficient size to overfill the cup of the specified grease worker by an amount such that the cup will be at least level full after working. At least 1 lb. will be required.

Procedure

5. (*a*) Transfer sufficient of the sample to the cup of the clean grease worker to fill it heaping full (mounded up about ½ in at the center), avoiding the occlusion of air by packing with the spatula. Assemble the worker, open the vent cock, depress the plunger to the bottom, and insert through the vent cock a suitable thermometer so that its tip is in the center of the grease. Place the assembled worker and the grease cup in the 77 F. air bath until the temperature of the worker and contents and the grease cup is 77 ± 1 F. as indicated by the thermometer. Then remove the worker from the bath and remove the thermometer and close the vent cock. Subject the grease to 60 *full* double strokes of the plunger, completed in approximately 1 min., and return the plunger to its top position. Open the vent cock and remove the top and plunger. As the penetration of a worked lubricating grease may change significantly on standing, it is imperative that the operations described in Sections 5(*b*) to (*e*) be performed without delay.

(*b*) By means of a spatula transfer the worked grease to the small grease holder, filling each half of the split cylinder and taking care that air pockets are avoided. Then clamp the two halves together by means of the brass collar as indicated in Fig. 2. Replace the grease cup in the bath for a sufficient time (approximately 20 min.) to compensate for any slight change in temperature during the filling period. Scrape off the excess grease extending above the brim of the cup by moving the blade of the spatula, held inclined toward the direction of motion at an angle of 45 deg. across the brim of the cup.

(*c*) Place the cup on the penetrometer table. Observe that the cone is in its "zero" position, and lower as a unit the

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one and indicator assembly until the one tip nearly touches the surface of e sample at a point as exactly as posible at the center of the cup. Securely ck the cone and indicator assembly in osition, and bring the cone tip down to st touch the surface of the sample by ans of the slow-motion adjustment. perating the release mechanism rapidly, lease the cone shaft and hold it free r exactly 5 sec., observing that the rease mechanism does not drag on the aft. Then gently depress the indicator aft until it is stopped by the cone shaft d read the penetration from the indiator scale.

(*d*) Following each test, clean the netrometer cone by wiping it carelly with a clean cloth while holding securely in its raised position (to avoid nding its shaft). Rotating the cone is be discouraged, as it may cause wear the release mechanism.

(*e*) If check results are desired, add new supply of grease to the grease cup d repeat the test as described in Secons 5(*b*) and (*c*).

PROCEDURE B. PENETRATION OF UNWORKED LUBRICATING GREASES

Sample

6. A sample of grease of approximately 4 g. is required to fill the grease cup. However, a smaller amount may be evaluated, if the grease is not too soft, by using wooden plugs to fill the lower part of the cup.

Procedure

7. (*a*) Place the sample and grease cup in the bath and bring to 77 ± 1 F. Then transfer the grease to the grease cup by means of a spatula, filling each half of the split cylinder and taking care that air pockets are avoided. Then clamp the two halves together by means of the brass collar as indicated in Fig. 2. Replace the grease cup in the bath for a sufficient time (approximately 20 min.) to compensate for any slight change in temperature during the filling period. Scrape off the excess grease extending above the brim of the cup by moving the blade of the spatula, held inclined toward the direction of motion at an angle of 45 deg., across the brim of the cup.

(*b*) Determine the penetration of the sample as described in Sections 5(*c*) and (*d*).

(*c*) If check determinations are desired and enough grease sample is available, repeat the test with a new sample as described in Sections 7(*a*) *and* (*b*). If insufficient sample is available for the second test, another penetration may be made on the sample in the grease cup.

Reproducibility

8. The reproducibility of the procedures described in this method should be ± 7 points.

New Members . . .

With splendid regularity this column has been able to bring to the readers of "The Institute Spokesman" not only the names but a brief bit of information about the new members that have joined the National Lubricating Grease Institute.

This month we welcome the Delta Petroleum Company, Inc., of New Orleans, La., P. O. Box 7335.

The Company is a very recent addition to the Lubricating Grease Manufacturing Industry having been organized under a Louisiana charter, July 8th, 1946. Ground was broken for the plant August 15th, 1946 and the first shipment of lubricating greases was made November 1st, 1946.

Continued on following page

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NEW MEMBERS

Continued from Page 17

Existing facilities include a modern plant for the manufacture of all types of greases and the compounding of lubricating oils, as well as storage and packing facilities for export and domestic marketers. Delta is not now, nor does it contemplate entering the export field directly, but will continue to serve exporters as well as domestic marketers on specification greases and oils.

The personnel of Delta Petroleum Company, Inc. is thoroughly experienced in the manufacturing and marketing of lubricants. All of the key men have devoted their entire business careers to the Lubricating Industry. The Company is headed by Mr. E. J. Ellis, Jr., President; T. A. Maxwell, Vice President in Charge of Manufacturing and Research; M. C. Carter, Vice President in Charge of Marketing; A. M. Pozzi, Secretary-Treasurer; A. L. McGinty, Jr., Sales Manager and I. W. Severson, Superintendent.

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PROGRAM
15TH ANNUAL CONVENTION
of the
NATIONAL LUBRICATING GREASE INSTITUTE
EDGEWATER BEACH HOTEL, CHICAGO, ILLINOIS, OCTOBER 16-17-18, 1947

THURSDAY, OCTOBER 16, 1947

Registration—Foyer—8:30 A. M.
Registration Fee $1.00 for all members and guests.

Morning Session—East Lounge
10:30 A. M. to 12:30 P. M.

Address of Welcome
MR. H. P. HOBART, President N. L. G. I.
Gulf Oil Corp., Pittsburgh, Pa.

"Fats, Oils and Fatty Acids for Industrial Purposes"
MR. DALE V. STINGLEY
Armour & Co., Chicago, Ill.

•

Board of Directors Meeting
12:30 P. M.

•

Afternoon Session—East Lounge
2:00 P. M. to 4:30 P. M.

"Metallic Soaps"
MR. S. B. ELLIOTT, Ferro Chemical Corp.
Bedford, Ohio

"Grease Making, An Art or a Science?"
MR. C. L. JOHNSON, Pres. Jesco Lubricant Co.
Kansas City, Mo.

"The Grease Phase of Steel Plant Lubrication"
MR. C. E. PRITCHARD, Chief Lubrication Engineer
Republic Steel Corp., Cleveland, Ohio

•

Annual Business Meeting
4:30 P. M.
of N. L. G. I.—Active Members

FRIDAY, OCTOBER 17, 1947

Morning Session—East Lounge
10:00 A. M. to 12:30 P. M.

"Progressive Public Relations For The Progressive Petroleum Industry"
MR. HENRY L. PORTER, Manager Sales Promotion (Wholesale), Standard Oil Co. (Indiana), Chicago, Ill.

"Research—The Third Dimension"
MR. HAROLD VAGTBORG, Pres. Midwest Research Institute, Kansas City, Mo.

"Some Test Equipment for Greases"
MR. R. J. S. PIGGOTT, President-Elect S.A.E.
Pittsburgh, Pa.

•

Board of Directors Meeting
12:30 P. M.

•

Friday Afternoon—East Lounge
2:00 P. M.—4:00 P. M.

N. L. G. I. Technical Committee Meeting
MR. CARL W. GEORGI, Chairman
Enterprise Oil Co., Buffalo, Presiding

1. ***Reports on Activities of Other Grease Committees:***
   (a) A.S.T.M. TECHNICAL COMMITTEE G
   Section I on Analysis Methods
   Gus Kaufman
   Section II on Consistency Test Methods
   E. W. Adams
   Section III on Performance Tests
   T. G. Roehner
   (b) A.B.E.C.—N.L.G.I. JOINT COMMITTEE
   T. G. Roehner
   (c) A.P.I. LUBRICATION COMMITTEE
   Chassis Lubrication Panel
   C. W. Georgi
2. ***Need for Less Expensive and Less Complicated Grease Test Apparatus and Methods:***
   (a) Microworker
   (b) Simplified Anti-Friction Bearing Test Apparatus
   (c) Other Apparatus and Methods
3. ***New Institute of Petroleum Test Method for "Oil Separation on Storage."***
4. ***N. L. G. I. Consistency Classification Proposals to request adoption by S.A.E. and/or A.S.T.M.***
5. ***New Business.***

•

COCKTAIL HOUR
6:00 P. M.—West Lounge
Members and their guests, including ladies
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ANNUAL BANQUET
7:00 P. M.—Grand Ball Room
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Banquet Speaker DR. H. D. HASS, Head, Department of Chemistry, Purdue University, Lafayette, Ind.
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Saturday Morning—East Lounge
N.L.G.I. Technical Committee Meeting
10:00 A. M. to 12:30 P. M.
MR. CARL W. GEORGI, Chairman
Enterprise Oil Co., Buffalo, Presiding

6. ***Symposium on Pumpability of Grease and Delivery Characteristics of Dispensing Equipment:***
   (Continuation of October 1946 Symposium on same subject)
   Discussion and decision on future program activity, particularly whether it would be desirable to set up a cooperative program to evaluate the pumpability characteristics of various representative types of greases and the delivery characteristics of typical types or models of dispensing equipment.

OBART ELECTED VICE RESIDENT OF GULF

The board of directors of the Gulf Oil orp. and Gulf Refining Corp. last week ected H. P. Hobart vice president in arge of lubricating oil sales.

Mr. Hobart, a graduate of Yale Uniersity's Sheffield Scientific School, was ociated with the Cleveland Electric uminating Co., the Otis Steel Co., and e MacIntosh-Hemphill Co., prior to orld War I. He saw service in France ring the first world war, attaining the nk of captain. Since 1930 he has been neral manager of lubricating sales for ulf.

In all his 28 years with Gulf, Mr. obart has been active in petroleum asso- ation activities. Among his various fices he currently is chairman of the bricating committee of the API, trustee the NPA and a member of several chnical committees.

He has served with credit and distinction as president of N. L. G. I. this past year and the Institute has written a great record under his capable leadership.

NEW DIVISION LUBRICANTS MANAGER FOR SHELL

Karl H. Nonweiler of 94 Lakeland Drive, N.E., has been appointed Lubricants Department Manager for the Atlanta Marketing Division of Shell Oil Company, Incorporated. In this position he is responsible for the sales and distribution of Shell lubricating oils and greases throughout the Southeast.

Nonweiler graduated from the U. S. Naval Academy in 1925 and was on active duty until 1930. He joined Shell as a Lubricants Department Staff Engineer in 1932 and became Division Lubricants Manager at Indianapolis in 1936. After playing an important part in establishing the "Shellubrication" method of automotive lubrication he returned to St. Louis to organize and conduct the first Shell lubrication school. He then served as Southeastern Division Lubricants Manager in Jacksonville until recalled to active naval duty in 1940, as a lieutenant commander.

After serving as executive officer of the service schools at Great Lakes Naval Training Station, Ill., and commanding officer of the naval training school at Sampson, N. Y., Nonweiler commanded the U.S.S. *Whitney* in the Pacific theater. He was released from active duty in July 1946 with the rank of captain and returned to Shell as Senior Staff Engineer in the New York Head Office, a position he held until his present appointment.

Among his military honors are the Legion of Merit and Commendations from the Secretary of Navy and the U. S. Naval Reserve. He is a member of the Masons and the Shriners and has served as commander of naval reserve units in St. Louis, Detroit and Indianapolis.

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